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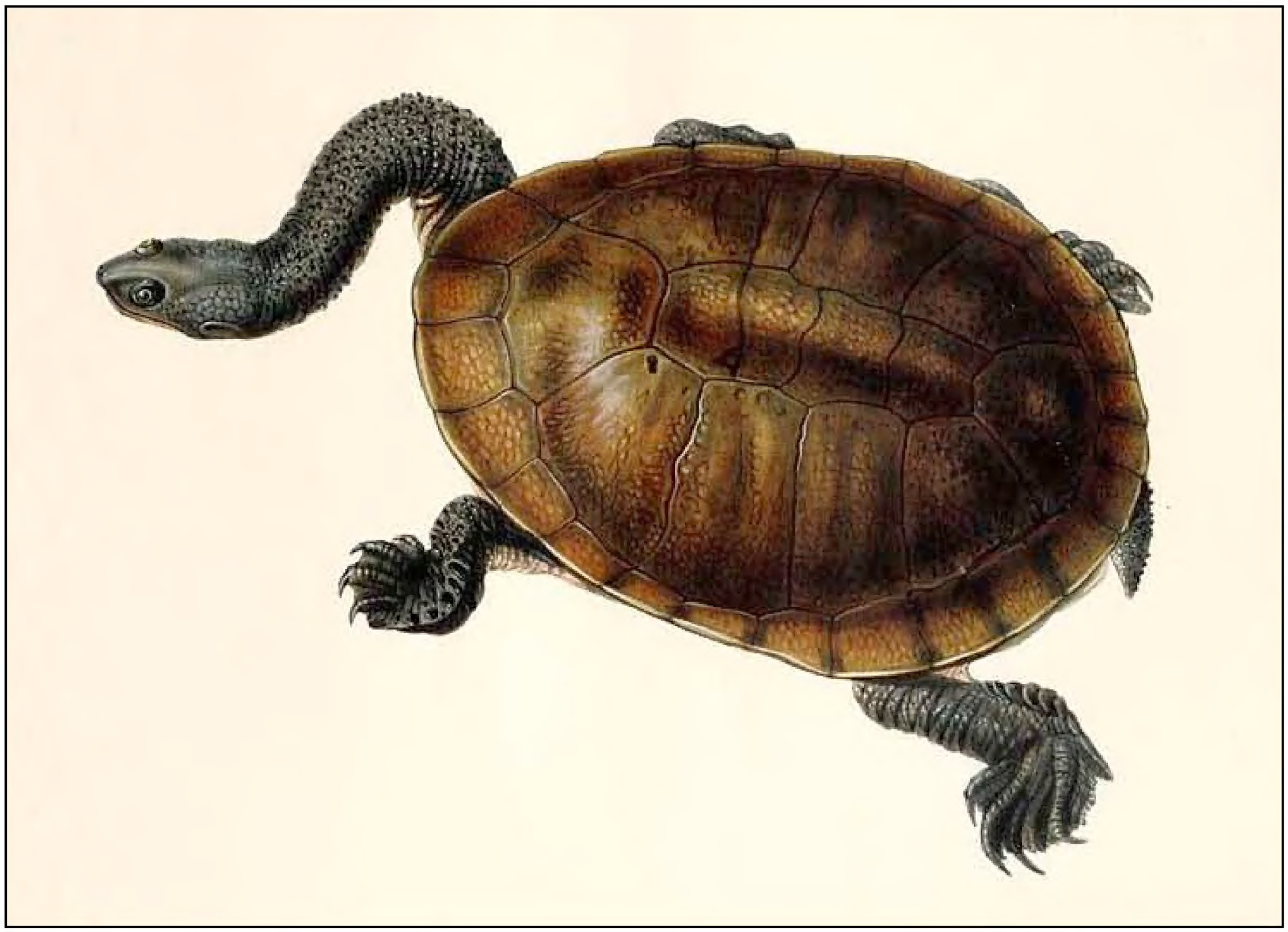

BULLETIN OF THE CHICAGO HERPETOLOGICAL SOCIETY
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Assessing Road Mortality in *Ambystoma laterale* at Presque Isle Park (Marquette, Michigan)

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Introduction

Roads have detrimental ecological effects on numerous taxa through both habitat fragmentation and direct mortality via vehicle-animal collisions (Glista et al., 2008). Road mortality, or "road kill," has disproportionately large adverse effects on amphibian populations and may be a major factor contributing to global amphibian declines (Carr and Fahrig, 2001; Eigenbrod et al., 2008). Road mortality poses a significant threat in part because many amphibian species migrate to and from breeding areas annually and amphibians have an observed lack of behavioral responses to road hazards (Glista et al., 2008; Beebee, 2013).

Amphibians represent the highest proportion of road mortality when compared to all other vertebrate groups, probably constituting up to two-thirds of all vertebrate road casualties; in some cases more than 90% of all wildlife road deaths are amphibians (Beebee, 2013; Fahrig and Rytwinski, 2009). Additionally, the reduced gene flow resulting from fragmented populations due to roads can cause significant declines in genetic diversity (Beebee, 2013). Results from a study of *Plethodon cinereus* (red-backed salamanders) demonstrated that the genetic difference between salamander populations bisected by a road was significantly greater than that of populations that were equidistant yet on the same side of the road (Marsh et al., 2008).

Salamanders are consistently recommended as bioindicator species and are facing worldwide declines from *Batrachochytrium salamandrivorans* (Bsal), a deadly fungus at risk of spreading to North America, which makes them an excellent candidate for assessment and proactive management (Davic and Welsh, 2004; Yap et al., 2015). Furthermore, there has been little published on how roads and mitigation techniques affect long term population dynamics of amphibian populations (Beebee, 2013).

Presque Isle Park is a 131-hectare wooded peninsula and municipal park in Marquette, in the Upper Peninsula of Michigan (Figure 1). Annually, thousands of *Ambystoma laterale* (blue-spotted salamanders) migrate from the interior of the peninsula to a breeding pool, crossing the only drivable thoroughfare (Peter White Drive) over several nights each spring. Since it has been shown that road mortality can lead to the decline of *Ambystoma* populations, we attempted to quantify the road mortality experienced by *A. laterale* at Presque Isle Park. Here we used marking techniques to estimate the proportion of *A. laterale* killed by vehicles at Presque Isle Park in April 2019. Additionally, we used morphological data to examine other factors influencing road mortality in *A. laterale*. We synthesized this information to make management recommendations.

Materials and Methods

We began surveying when temperature and precipitation levels were sufficient to trigger a migration event. Substantial salamander movement occurred over 5 nights in April (4/7, 4/8, 4/17, 4/21, 4/22). We tagged *A. laterale* only on the first two nights, but recorded mortality numbers on all five nights.

The 300-m section of road crossed by salamanders was divided into three zones (approximately 100 m each). Researchers captured every *A. laterale* encountered in the several meter area adjacent to the east side of the road prior to crossing and placed them in a holding bucket for the appropriate zone. A subset of salamanders from each zone were weighed, sexed using visual characteristics, measured (snout–vent length), photographed with a consistent background with a camera held approximately 50 mm above the salamander, and then tagged before being released.

Tagging procedure - After morphological data was recorded, a salamander was tagged with either a 12-mm Passive Integrated Transponder (PIT) tag or a Visual Implant Elastomer (VIE) tag. The advantage of both of these techniques is that they provide a means to estimate proportion of mortality without data on total population abundance. For PIT tagging, we followed the stan-

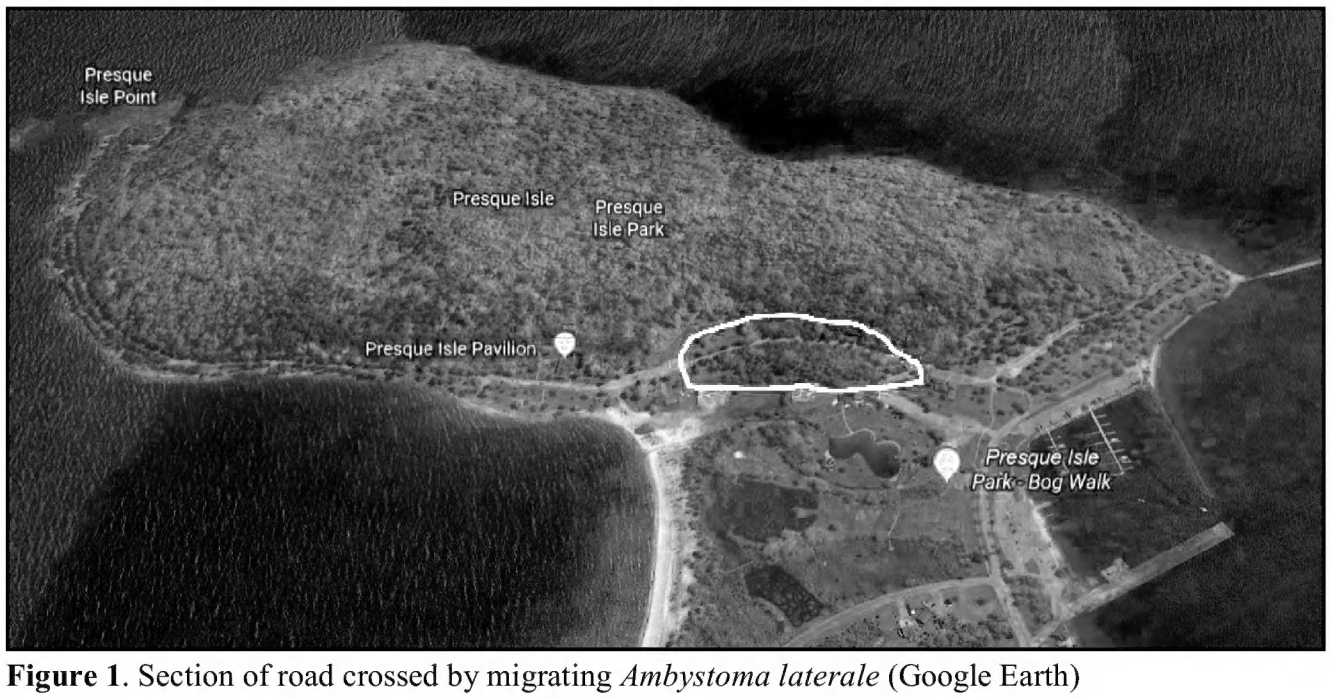

Figure 1. Section of road crossed by migrating *Ambystoma laterale* (Google Earth)

Figure 2. Dr. Jill Leonard inserting a 12 mm PIT tag into an *Ambystoma laterale*.

dard protocol proposed by Whiteman et al. (2016) for PIT tagging ambystomatid salamanders. Their methods resulted in 100% tag retention in overnight and 10-day laboratory studies, with no observed mortality or infection. For our tagging, a researcher positioned the salamander in hand so the legs and torso was restrained and the left side of its body was exposed. We then counted five to six costal grooves anterior to the rear legs and made an approximately 1.5-mm incision using a 70% ethanol sterilized scalpel. The incision only penetrated the epidermis and not the layers of muscle. Next, we inserted a PIT tag (12-mm HF PIT Tag Oregon RFID) into the incision and pushed it between the epidermis and muscle layers, parallel to the body. We inserted the tag to a medial point between the next two costal grooves, and bent the animal so that the tag gently pierced the body cavity underneath the epidermis (Figure 2). Finally, we inserted the tag through the incision in the epidermis. The tag was moved until it could be pushed through the hole in the body cavity, which did not line up with the incision in the epidermis and the tag was pushed into the body cavity.

VIE tagging involves injection of a nontoxic fluid under the epidermis; the dye is approved for use in animals and in addition to being colored, it is fluorescent under black light (Davis and Ovaska, 2001)). We restrained the salamanders in a similar manner to that of the PIT tagged salamanders, with their posterior side exposed. We then injected less than 0.1 mL of pink VIE dye mixed with curing agent under the epidermis of the right (4/7) or left (4/8) shoulder by inserting the needle approximately 3 mm subdermally and releasing the dye as the needle was removed. The syringe was then sterilized with an ethanol swab.

Tagged and untagged salamanders that were collected from each zone were released together in the zone in which they were collected. On the first night, salamanders were not released until the tagging of all 60 salamanders was complete. On the second night each salamander was released in its corresponding zone immediately after it was tagged, to avoid the bias associated with holding animals unnecessarily while traffic volume was presumably the highest.

Dead salamanders on the road were collected at will during the tagging procedure. Following the tagging procedure, the road was visually surveyed with a flashlight at 12 A.M., with all dead salamanders collected. This was repeated every three hours for the duration of the night (3 A.M. and 6 A.M.). At approximately 9 A.M., employees from the Superior Watershed Partnership surveyed the road a final time. Number of road mortalities was reported, but no salamanders were collected or measured by the Superior Watershed employees. The day following a migration event, collected dead *A. laterale* were scanned for PIT tags with an RFID reader, visually inspected for VIE tags with a blacklight, weighed, measured (if possible) for snout–vent length (SVL), and sexed (if possible) in the laboratory.

To estimate a proportion of salamanders at Presque Isle Park killed by vehicles, we divided the number of dead *tagged* salamanders collected by the total number of tagged salamanders (120). Mortality data were also compared on the basis of date, air temperature, weather conditions, and sex. This allowed us to draw basic conclusions regarding specific factors that may influence road mortality in a salamander population. Due to the large data set, novel conclusions about *A. laterale* morphology and behavior were also included.

Results

Over the course of 5 nights, we encountered thousands of *A. laterale.* We observed 429 *A. laterale* killed by vehicles at Presque Isle Park. Of the dead, 67 (16%) were visually identified as male, and 71 (17%) were visually identified female with the remaining indistinguishable due to physical damage from vehicles. There was substantial variation in the sex ratios according to the date of the migration. Weather conditions were similar each of the five nights (37–40°F) with rain, so it is unlikely to be a factor influencing sex ratios between nights. It appears likely that a higher proportion of males began their migration earlier than females (Figure 3).

Also, a higher proportion of deceased *A. laterale* were observed to be carrying eggs on the last two nights of the migration (Table 1). This could be due to increased movement of gravid females later in the year, or related to the greater time for egg development needed earlier in the month.

We tagged 120 *A. laterale*. Four of those tagged salamanders were recovered as carcasses killed by a vehicle. Four out of 120 gives a baseline estimated mortality rate of 3.3%. This value should be considered a conservative estimate for several reasons. Only one of the four tagged, dead salamanders recovered was tagged on 4/7. This could be due to tagging not beginning

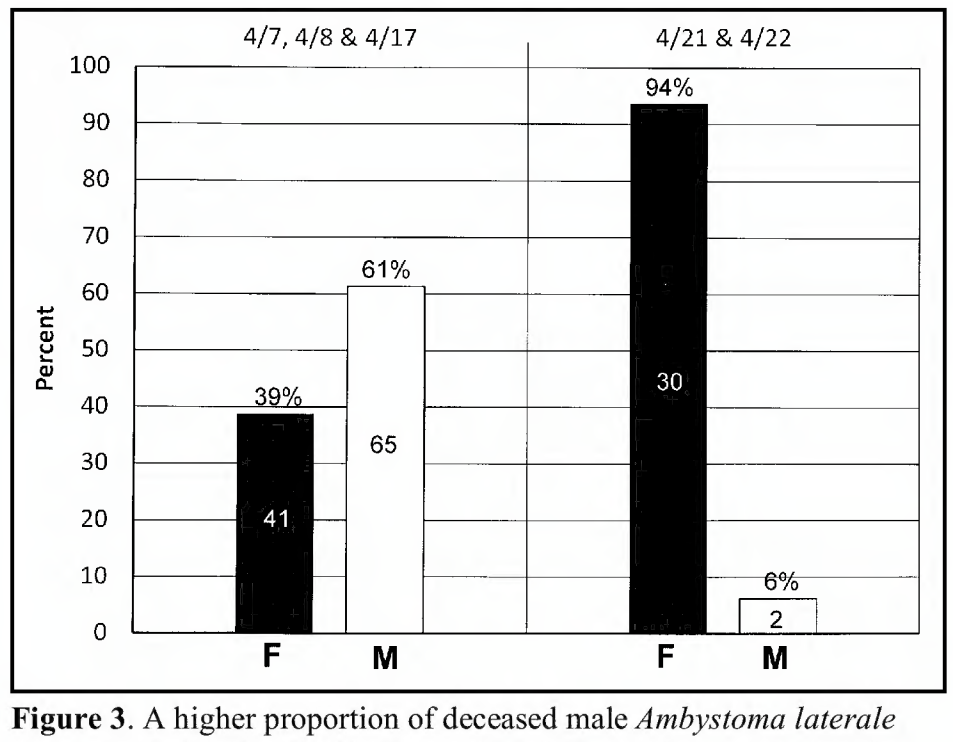

Figure 3. A higher proportion of deceased male *Ambystoma laterale* were recorded on the first three nights of the migration, while a higher proportion of females was recorded on the last two nights.

Table 1. Deceased *Ambystoma laterale* with eggs recorded.

	4/8/2019	4/17/2019	4/21/2019	4/22/2019
# w/ eggs	9	4	14	14

until 10 P.M., and tagged salamanders were not released until after 11 P.M., likely after traffic volume at the park had diminished. Tagging on 4/8 began earlier, at 9:30 P.M., and salamanders were released immediately after they were tagged, reducing the bias associated with holding salamanders in buckets as vehicles drive down the road. A more accurate mortality rate estimate may be reflected when 4/7 is excluded, yielding a new baseline mortality rate estimate of 5.0% of the tagged migrating population. Other sources of error include the possibility of tags being destroyed by vehicles and becoming undetectable. For example, for salamanders killed on 4/8 it would have been possible to identify a VIE tag on their shoulder for only 52% of animals. The number of PIT tags crushed by vehicles tires is impossible to estimate, but could be even higher. This suggests that our estimated mortality rate of 5.0% could be less than half of the actual mortality rate experienced by *A. laterale* at Presque Isle Park. Other potential sources of bias include salamander carcasses removed from the road by scavengers; Superior Watershed employees observed seagulls eating dead salamanders on the road. Additionally, there is a chance that heavy rain washed dead salamanders off the road, or that salamander carcasses stuck to tires. Finally, traffic volume at the park was probably lower on the dates of migration in 2019 as they all fell on weeknights.

It is more difficult to record the post-breeding return migration of *A. laterale* as it is less concentrated than the initial migration to the breeding pools and this movement was not a focus of our research. It should be taken into account that all post-breeding adults and newly metamorphosed juveniles will likely cross the road during their return to the interior of the park (Gibbs and Shriver, 2005). This could effectively double the mortality rate, depending on animal behavior and car activity. Given our estimate of tag destruction and including the potential return migration mortality, we estimate that human-caused road mortality for *A. laterale* at Presque Isle Park represents 10–20% of the breeding population.

We observed a significant size difference between both live and deceased males and females (Figure 4). Females were larger in terms of weight and length. They were also more variable in size, with female standard deviation in weight ±2.2 g compared to ±1.2 g for males. Standard deviation of SVL was ±0.79 cm for females and ±0.59 cm for males.

Discussion

A modeling technique developed by James Gibbs and Gregory Shriver in 2005 suggests that an annual road mortality rate of >10% for ambystomatid salamanders will lead to population decline and eventually local population extirpation. They recommend the implementation of mitigation techniques to reduce mortality rates below this threshold in order to sustain a long-term viable population of pool breeding amphibians. Since the mortality rate of *A. laterale* at Presque Isle Park may be above the threshold proposed by Gibbs and Shriver, we recommend the implementation of mitigation efforts at Presque Isle Park. It would likely be useful to attempt more research estimating the total population size on the island and increasing the accuracy of our mortality estimates, particularly given the likelihood of interannual variation based both on salamander and human (vehicle) behavior.

The two most effective and achievable options for limiting road mortality at Presque Isle Park are a temporary road closure during salamander migration or the construction of "ecopasses" under the road to allow for safe crossing by *A. laterale*. A temporary road closure of a section of Peter White Drive comes with the advantage of being low-cost and relatively simple to implement. If enforced, it should reduce the road mortality rate to 0%. At Presque Isle Park, there are no businesses or residences, so a night time road closure is practical, though it would restrict access to the Superior Watershed Partnership office and a popular recreation area during the evening, night, and early morning. A problem with this technique is predicting when the migration will occur. Other than the knowledge that it will probably occur over several nights in April at Presque Isle Park, it can be extremely difficult to predict exactly when the migration will begin. If selectively closing the road only during high migration nights, those involved in the road closure would need to pay close attention to nightime temperatures and predicted weather. It would be important to include public input for this plan and also, should it be adopted, employ a substantial advertisement of the road closure.

It may also be necessary to have volunteers monitor the road closure. One potential side effect of this would be that by necessity the public would be made much more aware of the salamander migration. While this has obvious educational benefits, the salamanders are highly vulnerable during their road crossing and care would need to be taken to manage human activities.

Alternatively, the construction of drift nets that restrict access to the road and funnel salamanders into underground tunnels (Figure 5) doesn't require the successful prediction of when the annual migration will occur. It is a labor intensive and monetarily expensive option with substantial initial costs. The Superior Watershed Partnership has offered to assist with funding and construction of ecopasses. The maintenance involved in the annual removal of debris (prior to migration) and prevention of flooding is also a factor to be considered. The scientific literature surrounding ecopasses for reducing road mortality in

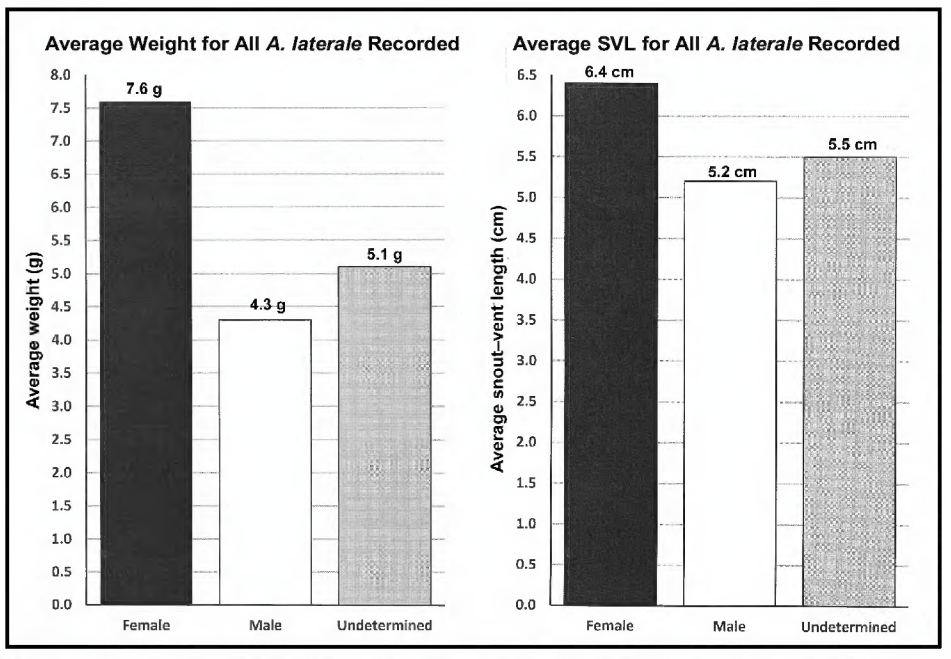

Figure 4. Deceased and live female *Ambystoma laterale* averaged larger than male conspecifics in weight (left) and length (right).

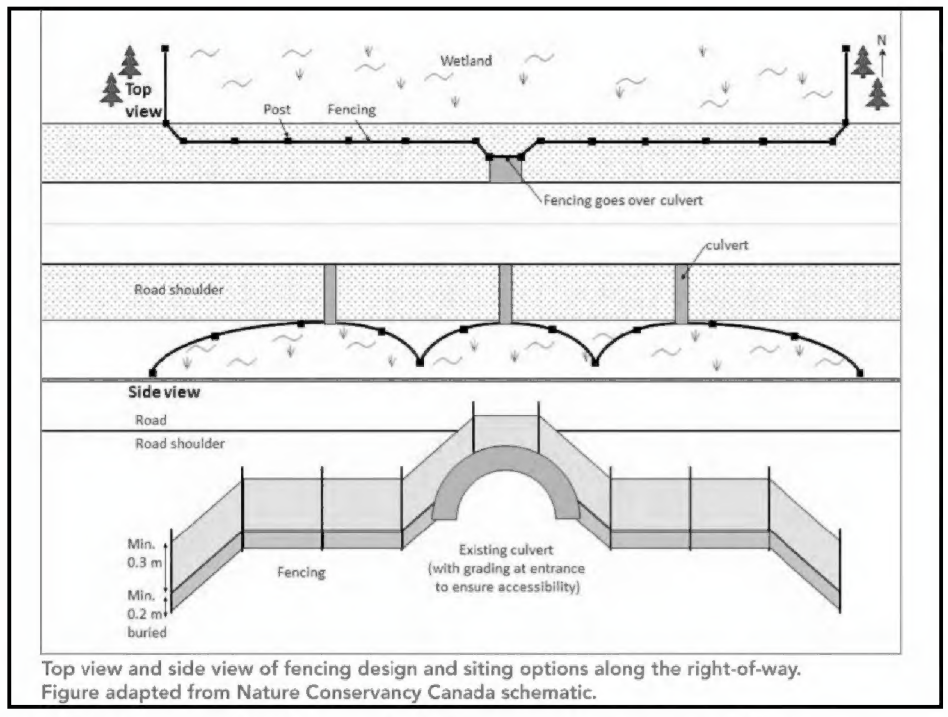

Figure 5. Example of fencing/tunnel crossing structures (Ontario Ministry of Natural Resources and Forestry, 2016) (image courtesy of Christopher Smith)

amphibians is well documented and is generally supported. In Alberta, Canada, mortality of *A. macrodactylum* was reduced from 10% to 2% of the population in a given year with eco-passes (Pagnucco et al., 2012). A site in Massachusetts reported an efficiency of 68.4%, with more than 75% of *A. maculatum* navigating the tunnels successfully (Jackson, 1996).

Should a mitigation plan be enacted, we plan on estimating mortality rates after mitigation efforts have been employed at Presque Isle Park. We will evaluate the effectiveness of the method employed for those making future conservation plans. Additionally, we have an ongoing project using an extension of the image-processing software, ImageJ, that will be used to evaluate whether individual salamanders can be recognized by a pattern mapping program based on spotting patterns. This would reduce the need for more invasive marking procedures such as fluorescent marking and toe-clipping that may be ineffective due to regeneration in salamanders and lead to mortality.

Genetic analysis of salamanders at Presque Isle Park should be conducted in the future. Two distinct morphological types were observed at Presque Isle Park. Most of the salamanders have a black background coloration and are covered in blue markings. Some of the salamanders were significantly larger (over 10 g), had a light gray background coloration, very few or no blue markings, and light-colored glands behind the eyes, somewhat resembling a Jefferson salamander (*A. jeffersonianum*). They were all visually identified as female. It should be determined if this distinctive morphotype is a female triploid hybrid complex with one or more other salamander species present in the DNA.

Acknowledgments

We kindly thank the Chicago Herpetological Society for funding this project with a grant for undergraduate research in herpetology. We would also like to thank Carl Lindquist and the staff at the Superior Watershed Partnership for their enthusiastic support of this project. We appreciate the help of numerous volunteers, especially Isabel Perez and Connor Masters, who assisted with data collection in the field and laboratory. We appreciate Michael Bieri's assistance in creating visual figures. Many thanks to members of Dr. Leonard's lab for sharing lab space and equipment.

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Why Did the Turtle Cross the Road?

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I am a turtle enthusiast and have been very fortunate to have had opportunities to work with turtles professionally. I really, really, really like turtles. This interest often leads me into talking about turtles to other people, which is (almost) always great. However, this summer, I've just heard far too many stories of people trying to do the "right" thing for a turtle in need but taking a very wrong approach to it. In summary, these actions remind me of the old adage (paraphrased) "The best intentions often pave the road to hell." In each case, some well-intending person observed a turtle trying to cross the road. This of course is a dangerous scenario for the turtle, as turtles and vehicles often don't result in a happy ending. The good Samaritan pulls over, picks the turtle up, correctly deeming that the roadway is an unsafe pace for the turtle to be. They proceed to place the turtle in their vehicle and drive somewhere else (typically to a pond they know of), and release the turtle into its "new and safe" home.

So, what is wrong with the above scenario? Why did the turtle cross the road? The answer is simple: to get to the other side! The turtle almost certainly was intentionally trying to get somewhere and needed to cross the road in order to do that. Perhaps it was a female Northern Map Turtle going to (or returning) from her yearly nesting spot. Perhaps it was an Eastern Box Turtle heading to the meadow on the other side of the road to chow down on some of the ripening berries there, as she has done every year since 1996. Perhaps it was a Spotted Turtle who was leaving the drying vernal pool to hang out in the marsh across the road for the rest of the summer. I could go on, but in any case, these turtles just needed help getting to the other side of the road safely, not a surprise relocation!

Moving a turtle to a "better" place can be bad for a number of reasons. Without getting too in-depth or technical, I'll very briefly summarize a few of these here. First, turtles often live long lives and get very acquainted with their home-range. So, moving a turtle several miles (or several counties..) down the road could really disorient them. They could wander trying to get back to their home-range, or may not adjust well to their new "home", even if it may be a similar habitat from which they came. This would be like taking a person and dropping them off in a town they've never heard of or been to before (without a map or phone to guide them)—it likely wouldn't end up being a very positive scenario.

Another thing this does is remove the turtle from the effective population in that area. So, they are no longer making baby turtles in their area, which might actually hurt the local population in a minor way, especially if the removed turtle is female. The evolutionary "strategy" of many turtles is to live a long time and produce many offspring, because few baby turtles typically survive until adulthood. So, removing an individual may have some degree of a negative consequence on the local population.

The final consequence I'll summarize may be the most potentially negative. Several infectious diseases are a concern for turtle populations and some individuals may carry a disease but seem healthy. Moving a turtle to a new area could be a means of helping the spread of disease, which could be detrimental to local turtle populations in the new area the turtle is moved to, and may also spread to other turtle species or even other critters depending on the type of disease that could be spread.

I understand that most readers of the CHS *Bulletin* are probably well-versed in many facets of herpetology, and so I am mostly "preaching to the choir" here. However, perhaps this can stand as a reminder to help spread information regarding the proper assistance of turtles crossing roadways. Folks who see a turtle attempting to cross the road and move it to a "safer home" are just doing what they assume is the best for the turtle. But it would be so much better for the turtle if they just get chaperoned across the road, and if the good Samaritans knew that they are just supposed to do that. In closing, here is my quick summary of advice if you see a turtle in need of a crossing guard:

1) Pull over in a safe place (put on hazard lights), and make sure that it is safe for you to exit your vehicle and approach the turtle (you won't be able to help any turtles in the future if you get run over yourself!).
2) Always move the turtle across in the direction it was traveling (otherwise it will just turn around and cross again once you drive away).
3) Be aware that the turtle may reward you for your help by defending itself (keep in mind that they think you want to eat them!). Be aware that all turtles, even cute little ones, have claws that they can use and have the capacity to bite. Some turtles may also urinate as a self-defense tactic.
4) Never pick up a turtle by its tail or a limb—this will cause injury. Find a safe spot on the shell away from the head and claws if you wish to pick the turtle up. Always use two hands to hold a turtle.
5) I formerly used the ice-scraper in my car to gently "push" large Snapping Turtles across the road until I got comfortable handling them—using something to encourage snappers to cross the road is probably the best advice for those who have not had much experience handling them.

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Book Review: *The Maryland Amphibian and Reptile Atlas*
Edited by Heather R. Cunningham and Nathan H. Nazdrowicz. 2018. xvii + 283 pp.
Johns Hopkins University Press, Baltimore, Maryland. Hardcover. $74.95. ISBN 978-1-4214-2595-5

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"*The Maryland Amphibian and Reptile Atlas* is a superb blend of scientific monograph and field guide and an example of the database most needed for future ecosystem analyses and conservation practice."—E. O. Wilson, from the back cover

Whether it is the peculiar shape of the state of Maryland—by far the oddest in the union—or just the proverbial problem with potable water, the seemingly routine matter of documenting the distribution of this small state's herpetofauna has attracted the interest of many naturalists but generally produced dismal results. With the exceptions of McCauley (1945) and possibly McClellan et al. (1943), from the time of Hay (1902) and proceeding through Kelly et al. (1936), Mansueti (1941), Reed (e.g., 1956a,b; 1957), Cooper (1960, 1965), Harris (1969, 1975) to Hildebrand (2005), there has been, and continues to be, a lack of rigor in synoptic works. The latest addition to this wearisome tradition is *The Maryland Amphibian and Reptile Atlas* (MARA), a joint effort of the Maryland Department of Natural Resources and the Natural History Society of Maryland. As someone who has spent much of the last 43 years documenting the distribution of Maryland's herpetofauna in a verifiable (specimen-based) manner, and having made modest progress at correcting the error-laden literature (e.g., Miller, 2010, 2011, 2013, 2014, 2015b,c, 2016), criticism of MARA poses an exhausting challenge. The maps in the book have been available online for several years, and having taken note of their numerous oddities I was hoping that they would have nothing more than a shadowy existence on the internet. However, now that Johns Hopkins University Press has seen fit to publish and enhance them, extensive commentary is required.

Although the Natural History Society of Maryland has been undergoing something of a renaissance in recent times, the same cannot be said for the Maryland Department of Natural Resources (DNR). Mismanagement by the DNR of the state's largest and best-known site for the endangered tiger salamander, *Ambystoma tigrinum*, a misguided attempt to "reintroduce" a non-native species, the pine snake, *Pituophis melanoleucus*, onto the Delmarva Peninsula, and a careless assessment of the status of the mud salamander, *Pseudotriton montanus*, have already been criticized (Lee, 2006, 2007a,c; Ashton et al., 2007; Miller, 2014). Additional contempt toward and ridicule of the DNR was published by Lee (2007b,d). Even Harris (2007b), in an ironically titled note replete with the usual absurd Received and Accepted dates, questioned certain practices of the DNR. Earlier, he (2007a) too fulminated against the DNR's stance on *Pituophis*. The latest venture by the DNR, an attempt at updating Harris's (1975) distributional survey using "citizen science," has also produced much to criticize. Since a thorough discussion of this work's many faults, contrary to the shameless plugging on the back cover by people with little or no knowledge of the herpetology of Maryland would greatly exceed the bounds permitted in a book review, I will focus mostly on general problems. Detailed criticism of the introductory material and most of the species accounts will have to appear in the future.

It is difficult to say where the problems start. Perhaps they begin with "citizen science" itself, so revered by many, but a previous effort using this approach in Maryland (Hildebrand, 2005) produced a work unworthy of publication. [Only a small portion of this work has been criticized (Miller, 2013).] Then there is the selection of the editors. Local herpers of a certain vintage will be mystified at their choice because neither have any qualifications for undertaking this project. Senior editor Cunningham is a deracinated Alabamian who has lived in Maryland for less than a decade; junior editor Nazdrowicz is from Delaware. Heretofore Cunningham has shown no interest in the herpetology of Maryland, and Nazdrowicz's demonstrable interest has been limited to the collection of 21 specimens and the publication in 2009 of a county record for *Hemidactylium scutatum*. But even here Nazdrowicz cited USNM 565980 for a specimen collected on 18 April 2008, when in fact he had collected the species (ANSP 37809) at a different locality on 14 September 2002. His casual report of *Eurycea cirrigera* from Maryland (pages 74-75)—a species new to the state—will require formal publication before it can be accepted. Only in Maryland could the anointed authorities on the herpetology of the state have so little attachment to it. Tacit admission by the editors that they were ill-equipped for this project is seen in their assignment of "History of Herpetofaunal Distributions in Maryland" (pages 6-20) to someone else. Unfortunately even here their choice was puzzling since its author has never done any serious field work, no museum work, and heretofore not published in herpetology. His essay, although a remarkable achievement under the circumstances, is nonetheless fraught with errors, significant omissions and irrelevant content. The editors' most glaring shortcoming is their ignorance of the literature, which is also manifested in the species accounts. Although many appropriate out-of-state references are cited, numerous in-state publications are overlooked. I estimate the number of overlooked papers to be around 200, and if distributional and natural history notes are included, another 200 or so could have been selected from. Perhaps the most egregious example of a poorly researched species account, that of *Pseudacris crucifer*, fails to cite the following papers: Forester and Czarnowsky (1985), Forester and Lykens (1986), Forester and Harrison (1987), Forester et al. (1989) and Lykens and Forester (1987). Of course, the editors share the blame and this is a stark example of their lack of familiarity with the literature. Furthermore, there

are publications that appear in MARA's references but are not cited in the species accounts, adding many more curiously neglected citations. As is typical of committees, one hand does not know what the other is doing. Even the back of the book states that "nearly a thousand dedicated citizen scientists . . ." were involved with MARA, when in fact over 2000 were (pages x-xvii). I am reminded of one definition of an expert: "Somebody from out of town who owns a briefcase."

There is also the problem of the title of the book versus its contents. Actually very little of MARA is concerned with distribution, and it is clear that no one involved with this project has a serious interest in this subject. The editors and perhaps others decided to turn MARA into natural history accounts accompanied by small maps with cursory distributional comments that are often in error. The species accounts typically follow this pattern: description, general range, historic range in Maryland, habitat, ecological notes, distribution as determined by MARA, conservation comments. This has left no space for a detailed discussion of distribution. The maps and superficial commentary are often at great variance with previously published maps and the distributional comments of others. A major procedural flaw was the republication of Harris's (1975) maps as a baseline for comparison with MARA's maps. The editors state: "These were point-based maps, using dots for each location a specimen had been collected." This reflects the editors' inexperience with Harris's unusual approach and their failure to read the literature they cite. I have stated and partially demonstrated that Harris's mapped sites are largely based on personal communications, which, of course, are not in the public domain and are therefore not readily verifiable (e.g., Miller, 2015b). It is extremely poor practice to replot someone else's localities without first determining and assessing their basis.

The organization of the species accounts in MARA is baffling and may well be unique for a book of its kind. No family names or higher level taxonomic categories are used as headers, and only a few references to families appear in the species accounts. Although the amphibians are treated in a logical manner (alphabetically by deduced family and species), most of the reptiles are not. Thus the turtles start with Trionychidae and are then followed by Cheloniidae, Dermochelyidae, Chelydridae, Emydidae and Kinosternidae. Lizards follow the amphibian pattern, but for non-venomous snakes one is left to guess which families or subfamilies the editors had in mind. Thus the sequence is Colubridae/Colubrinae (*Cemophora* through *Pantherophis*), followed by Dipsadidae/Dipsadinae/Xenodontidae/Xenodontinae (*Carphophis* through *Heterodon*) and concludes with Natricidae/Natricinae (*Nerodia* through *Virginia*). Viperids return to a logical sequence. The goal here should be to enable the reader to locate information quickly, not inexplicably shift in and out of phylogenetic schemes.

As mentioned earlier, it is evident throughout MARA that the editors and some species accounts authors have a deficient knowledge of the literature. A lack of field experience and knowledge of habitat requirements are also obvious, especially in the piedmont, the most thoroughly collected physiographic province in the state. Furthermore, no interest in the best documentation for species distributions—systematic collections—is found anywhere in the book. To cite several of the more egregious examples, seven undocumented reports of *Bufo americanus* (or *Anaxyrus americanus* as they call it) are mapped on the central Eastern Shore, involving three county records. This is in stark contrast to the maps in the four editions of Roger Conant's field guide, which range from 1958 to 2016 (only Powell et al., 2016 is cited below), as well as assertions by Conant (1993, 1997) and Gloyd and Conant (1990) stating that this species is absent from much of the Delmarva Peninsula. Harris (1969, 1975) also had no reports from this area. Although the author of the MARA species account notes this problem, MARA nevertheless maps these sites. This is irresponsible. [A similar reckless treatment for *B. americanus* was proffered by Hildebrand (2005, 2009).] Heretofore, there had been only one locality mapped for *Hyla cinerea* in the Maryland piedmont, a site in Montgomery County proximate to the Fall Line (Harris, 1969, 1975), which appears to stem from Cooper (1960, 1965). However, this site, like some in Cooper and many in Harris, has no traceable source. However, in MARA seven or eight allegedly documented sites are plotted in the piedmont, in addition to three others that have no documentation. Although the species account author acknowledges that the two remotest localities may be introductions, his claim that virtually all of them constitute range extensions is extremely dubious. If MARA was truly interested in distribution, these highly unusual reports would all have been discussed in detail. What is the habitat? Were choruses heard? Over the course of the MARA project, was there any indication of established populations? None of these questions are addressed. For *Scaphiopus holbrookii*, four interesting range extensions are mapped, one in Montgomery County and three in Washington County. The Washington County sites present a logical extension of the range as mapped in Pennsylvania (McCoy, 1982; Hulse et al., 2001; Meshaka et al., 2012), but there is no mention of this in the text. The Montgomery County site is isolated from all other documented sites in Maryland and adjacent states, and required a full explanation. Miller (2013) was the most recent author to discuss this species' distribution in Maryland, but this article is not cited in the species account, although it is listed in MARA's references. Other errors could be noted. Three nonsensical reports for *Malaclemys terrapin* and one for *Apalone spinifera* are mapped in the piedmont, but the *Malaclemys* account author is only willing to call them "presumed releases." Such reports should be discussed in the text, but never mapped. This can only lend credence to them, especially for those who do not bother reading the text. For *Pseudemys rubriventris*, numerous sites are plotted in the piedmont that do not possess habitat capable of supporting them. A much smaller number seem to be associated with artificial bodies of water, such as Liberty and Loch Raven Reservoirs. It is quite strange that no one else has ever noticed this startling distribution. Although feral turtles are a significant problem in Maryland (summary in Miller, 1993 and MARA lists nine obvious exotics on page 51), due to their size, difficulty in collecting and transporting, and other factors red-bellied turtles are not good candidates for introductions. I suspect the vast majority of MARA's piedmont sites are misidentified *Chrysemys picta* or have erroneous locality data. In addition, since MARA's map is at great variance with Harris (1969, 1975), once again considerable discussion was incumbent upon MARA,

but there is none. Inexplicably there are no species accounts for *Necturus maculosus* and *Pseudacris brachyphona.* Simply because MARA did not find these species hardly means they are no longer part of the Maryland herpetofauna. Yet even here there are errors and contradictions. On page 2, Table 1, both species are listed as "Native and naturalized amphibian and reptile species known to occur in Maryland." On page 28, Table 4, "Threatened and endangered amphibian and reptile species in Maryland during the Maryland Amphibian and Reptile Atlas project period (2009-2015)," *Necturus* is considered "endangered extirpated" (whatever that means) and *P. brachyphona* is listed as "endangered." On page 46, "Results of the Atlas Project" (authors unstated but presumably the editors), careless statements about *Necturus* appear. They cite Lee's (1972) report of the species in Garrett County, the first for the state, and claim: "This observation remains the only known occurrence of the species in Maryland," inexplicably overlooking Miller (2015a) who discussed a second locality for Garrett County reported by Lyons (1972). Miller (2015a) is cited in MARA's references. The editors further state: "The species has been introduced through releases in multiple locations in the New England region (Powell et al. 2016)." Powell et al. actually stated: "presumably introduced in several places in New England," although Klemens (1993) would have been a better authority to cite. At least 30 additional species in MARA require detailed distributional commentary. Two species mapped in Maryland, *Rana pipiens* and *Plestiodon inexpectatus* (Harris, 1975), are not even considered by MARA. *Pituophis melanoleucus* was also mapped by Harris and the controversy surrounding it mentioned in the introductory material (page 11), but the species is not listed in the index.

MARA is also incomprehensible with the number of original maps they publish for certain species. For ten species they correctly perceive to be rare, exploitable, or of limited distribution—*Ambystoma tigrinum*, *Cryptobranchus alleganiensis*, *Aneides aeneus*, *Hyla gratiosa*, *Glyptemys insculpta*, *G. muhlenbergii*, *Graptemys geographica*, *Apalone spinifera*, *Pantherophis guttatus* and *Crotalus horridus*—they publish only one map no more specific than the appropriate United States Geological Survey quadrangle. Yet for ten more taxa just as rare, according to their results, they publish two maps, the USGS quadrangle and a more detailed division of the quadrangle: *Eurycea cirrigera*, *Plethodon wehrlei*, *Pseudotriton montanus*, *Plestiodon anthracinus*, *Aspidoscelis sexlineata*, *Cemophora coccinea*, *Farancia erytrogramma*, *Lampropeltis rhombomaculata*, *Opheodrys vernalis* and *Virginia valeriae pulchra*.

A related criticism is MARA's handling of similar looking species. This should have been a paramount concern given that MARA's distributional data overwhelmingly came from novices. On page 38 they recognize that *Bufo americanus* and *B. fowleri* hybridize and have a separate listing for it that required "detailed verification" beyond the hearsay that characterizes much of this work. This being the case why was it not obligatory that both species required photographic evidence? Several dubious reports are mapped for *Bufo fowleri* in the piedmont, and other problems with *B. americanus* have already been noted. Other potentially confusing species pairs also required nothing more than hearsay to be accepted: *Rana catesbeiana* vs. *R. clamitans* (MARA uses *Lithobates*), *Kinosternon subrubrum* vs. *Sternotherus odoratus* (a major problem for one revered figure in Maryland herpetology; see Miller, 2015c), *Coluber constrictor* vs. *Pantherophis alleghaniensis* (the "blacksnake" problem) and *Opheodrys aestivus* vs. *O. vernalis*. Additional examples could be cited. Other inconsistencies are "detailed verification" being mandatory for *Plethodon hoffmani* and *Thamnophis saurita*, but not for *P. cinereus* and *T. sirtalis*.

Sensing the dog's dinner this project would become, I made no attempt to associate myself with it. However, at a time when interest in Baltimore County was low, the county coordinator asked me to provide him with whatever records I could. I obliged in a minimal way and sent him several emails over the years 2011–2014 of 16 species from the immediate vicinity of my residence and a record for *Chelydra serpentina* from between Fork and Glenarm. If the information I provided was typical of how data were processed by MARA, it does not inspire confidence in their attention to detail and may serve to explain many of their strange maps. Of the species I reported, there is no record of five on their website. There is also no record of the *Chelydra* just mentioned; however, I am erroneously credited with reporting this species from Baltimore City. For one species it is stated that I submitted a form; I provided no forms. In 2011 I repeatedly reported *Hyla chrysoscelis*, which calls from an abandoned swimming pool on my property, but it was rejected, following MARA protocol, due to a lack of recordings. However, if MARA paid attention to the literature and was aware of herpetological research in general they would have known that my data were valid (Forester and Miller, 1992, 1993; Otto et al., 2007). MARA cites two of these three references.

MARA presented an opportunity to contribute to the traditional documentation of distributions—preserved specimens. One wonders how many worthwhile DOR snakes and turtle shells were found during this project only to be discarded. At the very least, turtle shells were received for verification (pages 38, 44), but apparently none were retained. I checked with the collection managers of five regional museums (Academy of Natural Sciences of Drexel University, American Museum of Natural History, Carnegie Museum of Natural History, National Museum of Natural History, Natural History Society of Maryland) and four years after data collection for MARA concluded no material had been received, nor were any specimens received by Towson University.

In summary, given the limitations of the editors and nearly everyone else involved with MARA, review of the manuscript should have been recognized as obvious and essential. Yet despite extensive acknowledgments, there is no indication that it was shown to anyone with a knowledge of its purported subject. A poor and presumptuous book, bereft of focus and scholarship, has resulted, although it is very much in the Maryland grain.

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Of Owl Moths, Cuckoos and Considerate Rattlesnakes

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Two of the difficulties of producing a column of any temporal depth involve the memory of the readers, as well as picking up new readers. At times, both of these issues force me to be redundant with the information being presented. This author does not expect any of his readers to remember what was written a week after the column is read, let alone have a memory that reaches back across the span of many months or years. And if I launch into a subject that I've already beaten to death many times over, and expect the reader to already know these things, the new reader scratches his or her head and is left out. I once read a master's thesis 200 pages long, and asked a question of the author. The author got snooty with me! "The answer to that question lies on page 102, the third paragraph—why are you asking me this question?" The guy honestly thought that anybody who read his *ponderous* thesis would retain every word that was written! (This guy quickly learned how errant his thought patterns were with my rebuking response: "Are you so effing arrogant that you expect the world to memorize every word you ever write?"). The reader will be pleased to know that I don't expect that sort of thing. In fact, I'd prefer if you would just forget everything I write within seconds of reading it. That's how I personally handle these columns. "I said *what*? Prove it!"

Well, two things I've mentioned over and over are burned into my brain so deeply that I am loath to even bring them up again. The first is that for nearly 15 years, Gordon Schuett and I led the charge in a radio-telemetry study of five different species of venomous reptiles on a patch of ground called the Suizo Mountains. The second item that I have pounded more than once is that for those 15 years, I emailed reports and images to nearly 300 people under the subject matter of "Suizo Reports." That list started with very few people, but began to build as people either asked onto it, or, at the suggestion of friends, were enlisted. Along these lines, I have often been in the presence of herpetological name droppers, who take great joy in mentioning they have been in the field with so-and-so from Cornell, or Whatshisface from San Diego State, or some Animal Planet superstar. I just nod along and try to act wowed when I hear this sort of thing. What's the sense in telling people that I have hung with so many great ones that I don't even know who they are?

One such example of my hanging with an unknown superstar is a gentleman named Peter Lawrence. I'll be a little more specific: Dr. Peter A. Lawrence, Department of Zoology, formerly Oxford University, currently, Cambridge. (UK—you know, the Brexit people). If any readers of this column have ever heard of him, drop me a line! (I'm saying not a *one of you* will have ever heard of him. Surprise me!). Peter was added to the list by request of my friend Danny Brower, who unfortunately is no longer with us. (Danny died before I knew how great *he* was. Have any of you heard of *him*?). Anyway, every time I sent out a report, Peter would come back immediately with countless questions. He maintains an insatiable desire to understand *everything* about nature, and he holds a great interest in the herpetofauna of Arizona. Through time, I learned that he is the world's expert on owl moths. He not only knows owl moths and other insects by studying the "whatup" on them from the outside, he has written a prestigious, prize-winning book entitled *The Making of a Fly: The Genetics of Animal Design.* The dude wallows in molecules and chromosomes the way a prize chef might mix the complex ingredients of a culinary masterpiece. On two occasions, Peter donated $500 to our study. His thoughtful gifts allowed us to continue tracking rattlesnakes for another year. So the reader had better believe that when Peter asked me to lead a favored student protégé of his, one Gabriel Jamie, to a wild Gila Monster, I was on that request like stink on a monkey. Peter had the class to make the request private at first, so as not to put me in the predicament of possibly saying "no" to Gabriel in person. Split-second timing was going to be clutch, as Gabriel would be in Tucson one day, and would need a ride to the Tucson airport the next. It would all work out, and through Peter, I was soon in contact with the young Dr. Jamie.

Thus it came to pass that I met Gabriel on 16 August 2015. He was a man of youthful build, medium in height, handsome features, curly but well kept hair, and beautiful light-colored black skin. He originally was from South Africa, but was conducting his studies at Cambridge in the UK. As skin color plays somewhat of a factor in the story to follow, the author finds himself tripping over himself trying not to be a racist. I certainly can't call him black, due to some of our early conversation together, and since he isn't from America, I can't say he was African American either—because he wasn't from America. What a pickle this author is in! It is extremely frustrating to not be able to freely speak of race, or racial terms of identification, without offending somebody. While we fall all over each other trying to be sensitive and kind, we ignore the huge elephant that is in every home around the world. Our fear of openly discussing race only leads to deeper racism. And until we *all* thicken our skin—whatever color that may be, and learn to laugh about it, we will keep spiraling deeper into the abyss of hatred and misunderstanding. So, what shall we call my new friend Dr. Jamie, an "African-African?" One might ask why race should even be a factor in my description of him. There is a very good reason for bringing that fact up. The reader will have to wait to see the why of it.

The one fly in the ointment to finding Gabriel a Gila Monster (*Heloderma suspectum*) was that we had pulled transmitters from all the Suizo study animals two years previously. There is a 6-month period every year where I can just about guarantee seeing a wild monster. But 16 August is *not* within that 6-month time period. If we were to find a wild Gila, it would have to be an honest one. I chose a wonderfully pristine stretch of forested riparian area about 50 miles north of Benson, Arizona, as a place that had a high probability of producing one, and offered

good road cruising there and back. Poor Dr. Jamie got to see the ugly side of Roger Repp right off the bat when we attempted to check into the Motel 6 in Benson. The desk clerk may not have liked the looks of me, but it was more likely the look of Gabriel that brought about some over-cautious actions from his sorry ass. The reader must understand that the town of Benson is populated by a very conservative blend of Mormons. Once again we tread delicate ground, as Mormons don't like to be called Mormons. They prefer "members of The Jesus Christ Church of the Latter-day Saints." But even the most ardent of them will admit *that* is a mouthful, and accept the abbreviated "LDS." Like everybody else, there are good LDS folk, and there are bad LDS folk, and this one was one of them there bad LDS folk. We won't be painting the belief of all LDS folk with too broad a brush, but there is a strong notion among some of these folk that the whiter the skin, the closer to God one is. Me with my dark farmer's tan, and Dr. Jamie with his darker natural tan, was not leaving an immediate good impression with this blue-eyed ginger dickhead behind his desk. We were probably hell-bound in his estimation. After the dude tried to get me to fill out a third form to gain access to a room, I informed him that we were either getting a room *now*, or I was taking my business elsewhere. I also said that within 48 hours of this moment, an email would go out to over 300 potential guests, as well as certain corporate members of the higher echelons of Motel 6. *All* would get something from me with dates, times, and his (dickhead) name in lights. Hence, we got a room—at a discount no less, and things calmed down.

Once we had stashed some of our gear, and were rolling toward our destination, Gabriel pulled a race card on me. No, I mean it! He carries one on his wallet! Perhaps the hassle at the motel inspired him to do this, or perhaps there were other reasons—not the least of which would be an example of how deeply race still comes into play in his culture. Even though apartheid had ended in South Africa in the 1990s, when he was but a baby, he still carries a card in his wallet. This card is basically a genuine race card. His picture is on it, and the typed, abbreviated text on this card indicates that his ancestry contained a high percentage of white genetic pedigree. In essence, the white blood that he carries in his veins granted him certain privileges under the old apartheid system, and still means something in South Africa to this very day. (My wife the anthropologist is not happy that I did not think to photograph this card. But, as I told her, examples of these are all over the web if one seeks them). Had Dr. Jamie asked me to judge his race, I would have immediately said "black." Here in the states, that would be the proper guess to make. He had the hair, and the skin color, to make that an accurate estimation. But—and there *is* a but here—if I were really honest with him, I would have called him "off-white." I made that mistake once (once!) with a black friend here in the states, and it was not well received. I would imagine that to somebody like Dr. Jamie, being called off-white might be perceived as a compliment. Enough! For now, I want the reader to think of conservative LDS people, and how somebody like Dr. Jamie might be perceived in their world. And know that even I, with all of my diversity training (considerable), would have called him black if asked.

When this race card business was behind us, our discussion soon moved to the direction of how Gabriel met Peter. They had met at Cambridge. It was a relationship of mentor and star pupil, one of deep, mutual respect. While Peter was not formally his advisor, he nevertheless was highly influential with the future of this rising star. Peter was his advisor in all but name. We eventually discussed the nature of Gabriel's study. At the time, he was working on the calls of cuckoos in Africa, as well as how certain parasitic birds take over the cuckoo nest and imitate their calls to deceive the parent. Yup! Birds talk to each other. So do snakes, but good luck explaining *that* to any doubters!

As Gabriel went on enthusiastically about his world, I've got to say that I tried to put myself into his shoes. I thought of my father. My dad lucked out with me in that I decided to jump into a trade rather than attend college. But had I wanted college, dad would have done everything in his power to help me make that financially possible. But had I wanted to attend college to learn how birds speak to each other, dear old dad would have devoured every cent in his possession, and refused to defecate. Oh, yeah, count on it! Perhaps the apple did not fall far from the tree, for I found myself asking the following question of Dr. Jamie: "Do you think your study of birds will provide you with a living for the rest of your life?" His response floored me. It was one of absolute, unshakable faith. He not only *thought* he was set for life, he *knew* it! He was steadfastly sure that he was on a career path that would keep him comfortable for life. Thus far, all indications are that he was correct. I can only conclude that the biological study aspects of academia are more steadily funded in the UK than the perennial soft money aspects of research funding here in the states.

While en route to our herping spot of the day, Gabriel mentioned that he had never seen our local variety of cuckoo—the roadrunner. This news got a big guffaw out of me. I told him we would be lucky not to die in a stampede of them, so common were they in these parts. He went on to question if I had ever heard their song. The poor guy had no idea that he was talking to deaf-assed Roger Repp, who at the time, was still wondering what that vibrating gizmo at the end of some of our regional snakes sounds like. But I saw no need to demonstrate this frailty to him, and responded:

"You bet I've heard their song!"

"And what do they sound like?" He asked.

"They go something like this," I replied. "MEEP MEEP!"

"Really? The ones in Africa go more like: Tweety Tweety." (As he was explaining this, he performed a much more accurate rendering of a cuckoo's song. It is the wont of bird people world-wide to produce the sounds their charges make, which they all perform without blanching or embarrassment. This author knows not how to spell all the chirpie-cheep-cheep noises that were orally uttered for my benefit here.)

"Nice job," I responded after Dr. Jamie's performance. "But ours go MEEP MEEP. Perhaps adenoids run rampant in our population?"

I do hope the day comes when the lad gets to see a Roadrunner and Wile E. Coyote cartoon, in order to better appreciate my rapier-sharp wit. And any would-be roadrunner stampedes did

Figure 1. The one and only image that, due to the author's lame advice, Gabriel Jamie was able to get of his very first wild Gila Monster. The least we can do is publish it for him! Image taken 16 August 2015 at 1857 hrs.

Figure 2. Like a kid sucking down a short strand of spaghetti! Shoom—down the hole she goes. "As a requiem to Dr. Jamie's first and perhaps *only* personal wild Gila Monster, I attach an image that would be similar to what happened here. Sorry about that, Doc!" Details can be found in the text. This and all remaining images by the author.

not ensue doing the entire 1.5-hour ride to our herping spot. Not a single one showed so much as a tail feather all the way there. Fortunately, there was quite the onslaught of them the following morning, prior to me somehow getting Gabriel to the airport alive and well, and on time. But that is *another* story . . .

We arrived at our hiking spot at 1750 hours. The air temp was 32°C (89.5°F), the cloud cover was 50%, humidity 25%, with but a hint of gentle breeze. The place has a proper name, but I have no wish to tell 400-plus herpers where to go in mid-August to find a Gila Monster. We shall instead just say that two of us entered a spring-fed, very wide streambed that maintains an intermittent yet perennial shallow trickle of water year round. (And terrifying, raging floodwaters in times of heavy rains). It was flanked on either side by a cathedral of massive sycamore, cottonwood, and oak trees. Grassy, cat-claw and boulder-infested hillsides lined either embankment. It was located at an elevation of 4,000 feet, and was very atypical habitat for Gila Monsters—which are there in force regardless. We hoofed downstream for nearly an hour without seeing much, and then separated with the agreement to meet by a certain spot at a predetermined time. Shortly after we parted, I spied a massive black bear ambling my way. Yup! He was a great big bear, a way out there! I perhaps fancy myself in thinking that I saw him before he saw me. He was big all right, and as he continued coming straight at me, it was noted with some fretting and frowning that his shoulder height would come up to my belly button. He was longer than I am tall. This was not a good situation, and how I wished Gabriel was with me in order to offer a form of multiple choice of prey items. Did he want the big, fat, stinky slob, or some tastier, leaner beef? At about 20 meters off, he noticed me, and thankfully, his trajectory changed so that he veered at a slight angle to pass by. He kept looking my way as he passed, and I actually got some very good video of him. My still photographs wound up being just a series of very large blobs on the landscape. Shortly after he passed out of sight, Gabriel began hollering that he had found a Gila Monster. He was much closer to me than I had thought, and I was at his side in no time flat.

When I got there, Gabriel had a mid-sized adult female Gila Monster moving at a very brisk pace across a very open stretch of sandy wash. I saw enough of it to guess it as a female, but would know more as soon as I decided to make contact with it. Meanwhile, since the gaudily-colored orange and black little beast was on open ground, with the perfect golden hour lighting as its backdrop, I just stayed back and let Dr. Jamie take his photos. But the monster was not exactly being cooperative, and barreled into a sparse clump of downed twigs in the wash center. Gabriel only got one image, which can be seen in Figure 1. I fully expected the monster to settle in to this twig-island spot, and give Gabriel ample opportunity to photo her from all angles before we went into the geek show aspect of drawing blood and handling the hapless thing. With some alarm, Gabriel pointed to a small soil hole—perhaps 25 mm in diameter, in the center of this twiggy little nook in the stream bed. I laughed at this, and assured him that there was no way in hell that monster could go down that hole. As soon as those words were spoken, the monster dove headlong into that hole, and jetted out of sight. It was like watching a kid suck down a short strand of linguini—SHOOM—she was gone! Whoops! As a requiem to Dr. Jamie's first and perhaps *only* personal wild Gila Monster, I attach an image that would be similar to what happened here (Figure 2). Sorry about that, Doc!

We continued on into the night along the stream, with zero results. We started to return to my truck. In the early going of said return, Gabriel was wise enough to point out while we were supposedly returning to the vehicle, I was taking us the exact opposite direction that we needed to go. Yup—we were going the wrong way! Keep an eye on me folks! We still had hopes for the long drive to Benson. Oddly, we got all the way to the tiny hamlet of Pomerene before we found anything at all. Pomerene is in essence a suburb of Benson, three miles to the north. Perhaps 300 people live there. Houses and double-wide mobile homes line both sides of the road that leads in and out. Approaching from the north, as we were doing, the housing is spaced on roughly two acre parcels. Many have chest-high chain link fences guarding the front perimeter of their abode. Several have "No Trespassing" signs posted, and most of the residents are stalwart LDS folk who attend the large temple two miles down the road. At precisely 9:45 P.M., when we were in the

center of this part of town, a 1.1-meter-long Western Diamond-backed Rattlesnake (*Crotalus atrox*) was viewed crossing the road in front of us. It was ramrod-straight, coon tail and rattle held high, basically belly-inching its way from west to east across the road. I braked to a halt, and Gabriel was out of my truck with flashlight and camera in hand. He began to photograph the snake, which continued in its own unhurried fashion across the road. All the houses were dark on the outside, all porch lights had probably been extinguished an hour before we arrived. But the lights were on inside some of those houses, indicating that not all residents had turned in for the night. Thus far, we were probably safe enough to let Dr. Jamie do his thing. The snake continued on across the road, and into the front yard of one of these houses. I foolishly thought for a moment that Gabriel would end his photography at that point. But my jaw crashed right into my lap when Gabriel continued on the trail of that snake. His flashlight was blazing, and his camera flash popping halfway to the front door of the house. The snake finally crawled under a clump of bushes there, and he took a knee and continued to fire away.

I must confess to not knowing what the readership of this publication would do if he or she saw somebody prowling in their yard after hours like this. I know if it were my yard, I'd step out to investigate, and there would be something locked and loaded in my hand when I did. Two separate parties approaching each other at night is never a safe proposition, especially when one might be both scared and armed. And I can assure the readership that there is probably not a single house in Pomerene, Arizona, that doesn't keep a firearm handy, kept especially for situations such as this. I hang with a fearless crowd, and I can assure you that not a one of us would enter a front yard in Pomerene in broad daylight, let alone the dead of night! I found myself wishing that the bear had devoured me, which would have spared me from whatever was going to follow.

For me to shout at Gabriel at this point in time would have been the death of both of us. All I could do as soon as I observed this behavior developing was whisper: "P-s-s-s-t! Gabriel, no, don't do that. P-s-s-s-t—we gotta go. Now! We must be leaving…now…c'mon." But if my naïve new friend heard me, my words were but the passing noise of an irritating insect. His bent du jour was photographing his first large, wild rattlesnake, and he was completely incapable of any rational thought patterns or reason. And then, the snake began to loudly rattle—so loud that I could hear it all the way in my truck, which was still idling. I thought *surely* that rattling noise would draw some attention from the folk inside. I could just visualize a porch light coming to life, and front door opening. A burly dude holding a double-barreled shotgun in hand would next emerge. Upon noting his yard was being occupied by both a rattlesnake *and* a dark-skinned man—there *would* be bloodshed. I don't think Gabriel's race card would have impressed anybody in this situation. Had something like this happened, I was prepared to just take off and completely desert the lad. "Friends to the end, Dr. J old buddy—and this is the end!" Well, I continued to squirm and hiss at him for what seemed like two eternities. Gabriel finally decided he had seen enough, and climbed back into the truck. Fortuitously, nobody noticed the intrusion. I was prepared to give the lad a verbal double-barrel assault, but it never had the chance to happen.

"What an amazing animal," he said as soon as he stepped in.

"And how *considerate* he was to rattle at me to let me know of his presence." I could not get a word in edgewise as we jetted out of that neighborhood as quickly as possible. All the way to Benson, he went on and on about his encounter, each and every sentence containing the word "considerate," or derivatives thereof. It was hard to stay mad at somebody who had just experienced his first *atrox*, and was so obviously impressed with both it and his own epiphany. I guess to somebody who routinely added great significance to the meanings of bird calls, to him, the rattling of this snake meant something beyond a simple hard-wired response to danger. I must confess to never having placed much thought to the purpose of the rattling, and lean more toward a pissed-off or frightened animal issuing an audible warning in the only way it can. I found his "rattling out of consideration" thought patterns interesting and refreshingly new. There's a reason we pay deep thinkers the big bucks that they get for sure!

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I told you that story to tell you this one. Obviously, Gabriel's notion of the rattle being applied out of courteous consideration is stuck in my brain forever. To my dying day, I don't think I will forget that. On the evening of Sunday, 23 September 2018, I was happily watching the Detroit Lions beat the snot out of the New England Patriots on Sunday night football. The discerning Chicago Bears fan might frown on my delight at a divisional rival winning a game, but many who follow football might understand my disgust with the haughty, snobby and overconfident Pats. And their fans as well! *Anybody* can be Pats fan! I hope this game *destroyed* them. The other truth is the knowledge that the Lions have consistently, through all of history, sucked worse than the Bears. That is hard to do! I find it hard not to root for these hapless losers, as I truly feel empathy for them *and* their loyal fans.

By late 2017, I was the recipient of a set of hearing aids. They work well at keeping peace in the family. If I dial my football games down to a very low setting, and crank my hearing aids up to the highest, I can hear everything I need to hear, and save Dianna's ears (and temperament of the moment) in the process. Toward the end of the game, I hit the pause feature on the game to step out of the house, and retrieve something from the back seat of my truck. As it was going to be a quick mission, I didn't bother to put on shoes or sandals. In short, I was barefoot. Even though the porch light switch is an effortless short reach away, I did *not* flick it on. My hearing aids were still on at the highest level, and the roar of traffic on the nearby Silver Bell Road filled my ears as I stepped out into the pitch black night air and closed the door behind me. And then, suddenly, there was no more traffic—and a different kind of roar was filling my ears. I could not identify the sound right away, but as I hesitated in the dark, I soon realized it was the warning buzz that a large rattlesnake would make. Any person with even the slightest glimmer of comprehension would have immediately stepped back into the house and turned the porch light on at that point. Nope! That person would not be me. Instead, I stood still in the dark, and tried to pin point the location of the sound. Any per-

Figure 3. This image is a re-creation of the considerate rattlesnake that the author encountered on the evening of 23 September 2018. The snake in the image is made of plastic, and designed to hold a wine bottle. Offering a bottle of wine might have *truly* made the snake in Figure 4 a considerate rattlesnake!

son with even the slightest glimmer of comprehension perform ing *this* act would have immediately dialed the hearing aids down to their lowest level. But nope, *that* person was not me either. It was *much* more challenging to try to detect direction being in the state of surround-sound that existed for me. The hearing aids remained at full blast. That rattlesnake was below me, or above me, in front of me, or behind me. In short, it was everywhere! With a shrug, I wandered to the back door of my truck. The pathway to said truck was an approximately three-foot-wide swath of cement driveway that ran between my truck and my house. As I got to the driver's side back door of the truck, the noise of that rattle became nearly overwhelming. I paused for at least 30 seconds then, my eyes trying to pierce the darkness, my ears trying to filter direction out of the audible confusion of the uproar. Again, I shrugged, and cracked the door of the truck open. When I did, the dome light came on, and illuminated the scene enough for me to see that—just two inches from my calf—was the head a fully aroused, adult male Western Diamond-backed Rattlesnake! He was compressed against the gas meter along the wall of the house. He could not back away, as the meter sealed off his retreat. He could not move forward, as my right leg was in his way. In short, he was nearly smashed between me and the gas meter. He did all he could do by rising into a full defensive posture, and continue to keep his rattle singing. He could neither retreat nor advance—the tight quarters allowed him to only go upward (Figures 3 and 4).

There was a sudden flood of comprehension entering the brain of the otherwise witless individual who stood at the rear door of his truck. His feet did not fail him as he leapt away from the aroused snake. As soon as I moved, the snake struck. As one who knows the intent of a striking rattlesnake as well as anybody, I immediately noticed that this strike was not made with the intent of sinking fangs into flesh. The action was much too slow for that. It was so slow that I saw it all with clarity, bathed as it was by the baptism of light emanating from inside the truck. Not only was the strike slow—he didn't even open his mouth! All he seemed to want was to have me back off. It took *way* too much doing on his part, but in the end, the message was finally received.

Figure 4. The actual considerate rattlesnake moments before capture and removal.

Of course, back into the house went I. Snake tongs and bucket with a lid were hastily located, and back out I went, hooking Dianna en route. We got the snake in the bucket, sealed the lid, and we had him! My neighbors would take a dim view of what happened next. They would want me to kill it, or move it well out of the neighborhood. On the driveway side of my house is a heavily vegetated water retention basin that gathers and distributes floodwaters away from the neighborhood. It is roughly the size of the infield of a baseball field, has huge mesquite trees peppered throughout, and has heavily vegetated streambeds going in and out of it. At first, we tried gently dumping the snake out of the bucket just to the side of our driveway—which is the upper berm of the basin. He kept trying to come back up onto the driveway. I kept pushing him back down the berm with my tongs. During these push backs, he launched at least a dozen more of these slow, mouth-closed strikes. At best, they were performed at 20% the speed of an earnest effort. He was making himself clear that he wanted to come back to our driveway, while we made it equally clear that we didn't him there. I finally snagged him with the tongs, cocked the tongs to one side, and hurled him a good 20 feet through the air. He landed softly midway up a mesquite tree, and that was the last we ever saw of him.

There are two scenarios that come to mind with the thought process of this particular rattlesnake. The most likely scenario is the theory Dr. Jamie presented three years previously: A considerate rattlesnake who was only trying to warn me away from him. If there really is such a thing as a considerate rattlesnake, this one was one of those. I am 100% convinced that this snake did *not* want to bite me. But if we are to wax anthropomorphic enough to give that sort of rational thinking prowess to a rattlesnake, I'll take it even a step farther. That poor snake didn't want to bite somebody who was as stupid as I acted this evening, because stupid might be contagious.

This here is Roger Repp, signing off from Southern Arizona, where the turtles are strong, the snakes are handsome, and the lizards are all above average.

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What You Missed at the July Meeting: Michael Burger

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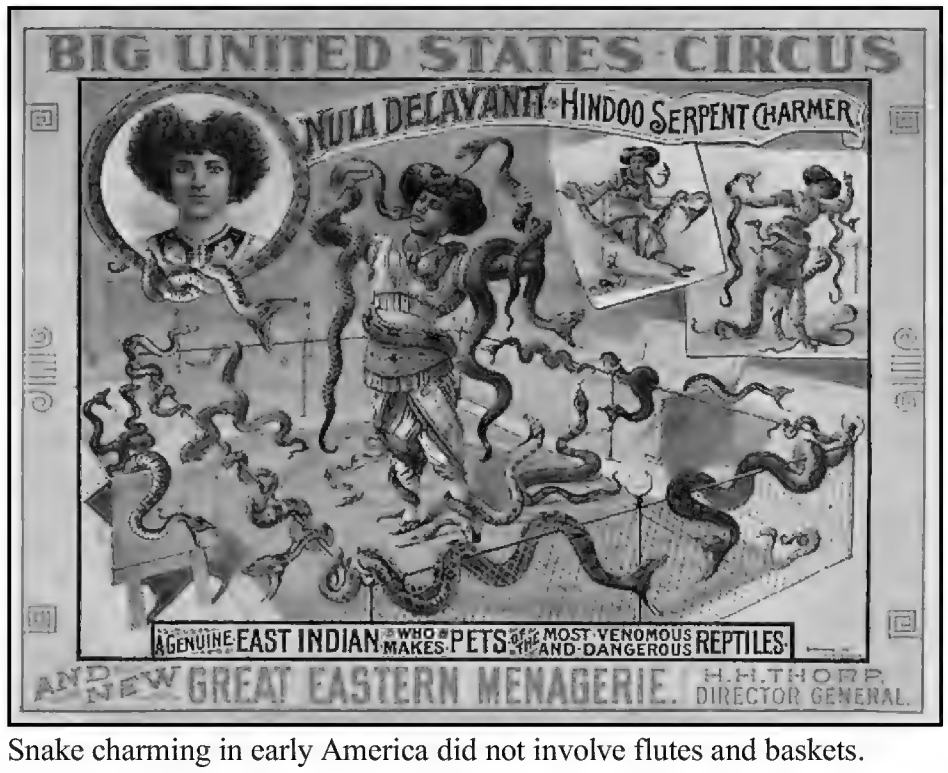
Here is the short autobiography that Michael Burger gave us to post on our web site:

> Hobbyist, zoo keeper, author, and photographer, Michael Burger was born on Chicago's north side before relocating to herpetologically diverse southern Florida in the 1960s. He is now a resident of the Lone Star State where he maintains a mixed and varied collection of lizards, tortoises, snakes, cats, and dogs.

Nowhere is historian mentioned, but it should be. Michael has been keeping reptiles for most of his life. His fascination with the hobby and the way it has changed over the time he's been involved has given him the opportunity to talk with many of the players in the field of herpetoculture. After years of reading and talking, and some research, he decided that the history of keeping herps in America needed to be recorded and consolidated. After still more years of intensive research, he wrote a book, *The Dragon Traders: A Collective History of the Reptile Trade in America and the Age of Herpetoculture.* His talk for us was titled, "The Fascinating and Sometimes Profound History of Keeping Herps in America."

During the talk his expertise became obvious as he dropped names and dates, anecdotes and opinions as easily as I could discuss yesterday's weather. Probably better. His immense knowledge allowed him to tailor his talk to Chicago, answer questions peripherally related to his presentation, and engage us with enough facts and photos that I am at a loss to determine what I should put in this article. Once again you're shorted if you didn't make the meeting, but once again I'll try and convey some of Michael's presentation.

He told us a short story about living in Florida in an area that was still heaven for a youngster fascinated by herps. He had a cage of mice on his back porch. One morning he noticed that all the mice were gone, but there was a fat corn snake in the cage. Like the "keeper I was back when I was ten years old, I put a brick on top of the cage and I said, 'great I have a corn snake.'" Of course, by next morning the corn snake was gone. Few among us have not made similar errors. He made the point that in the '60s and '70s nearly all pet herps were captured from the wild.


BIG UNITED STATES CIRCUS
NULA DELAVANTI HINDOO SERPENT CHARMER
A GENUINE EAST INDIAN WHO MAKES PETS OF THE MOST VENOMOUS AND DANGEROUS REPTILES
AND NEW GREAT EASTERN MENAGERIE.
H. H. THORP, DIRECTOR GENERAL.

Snake charming in early America did not involve flutes and baskets.

The opening slide demonstrated Michael's extensive research well. We looked at a short man standing straight-backed, wearing a sombrero, holding a long pole, with a pistol strapped to his hip. In front sprawled a half dozen or so crocodilians, and leaning over a fence, spectators scanned the alligators. The photo was taken in 1902 in West Palm Beach, Florida. The figure was known as Alligator Joe. I failed to see how this related to the Chicago history that Michael wanted to briefly cover, but the next slide showed a 1913 newspaper clipping of Alligator Joe's performance in Chicagoland—Forest Park, Michael believes. Linking those two disparate photos, times, and locations indicated Michael's depth of discoveries.

Michael proceeded to give us a rundown of how Chicago starred in the early days of herp displays, particularly side shows, theaters and dime stores displaying and selling reptiles. He said the 1893 Columbian Exhibition probably birthed the 800 or so traveling shows that toured the country in the 1920s, most including snake charmers. The charmers of that time would not fit the picture we have today, but probably simply handled the animals. Michael showed us some great posters of the era. A slide of a hut advertising alligator wrestling showed that the 1933 World's Fair also featured some reptiles. He jumped to 1963 to mention that the famous, but crude, Arthur Jones brought his *Wild Cargo* show to the International Amphitheater near the Chicago stockyards and showed us photos of that man taking extreme chances with huge Nile crocs.

He moved into Chicago herpetologists that many of us know. Howard Gloyd, early director of the Chicago Academy of Sciences and pit viper expert. Karl Schmidt, who was at the Field Museum and is perhaps best known for his death by boomslang. Robert Inger, a Field Museum expert on S.E. Asia and Borneo. A photo of Clifford Pope with two Chinese alligators standing by the Yangtze River. All the above were also authors and Michael showed us many of his books written by these men. But not only men, for Michael told us of Grace Wiley, the famous

Karl P. Schmidt, the noted Field Museum herpetologist who is unfortunately perhaps best known for having died from the bite of a boomslang.

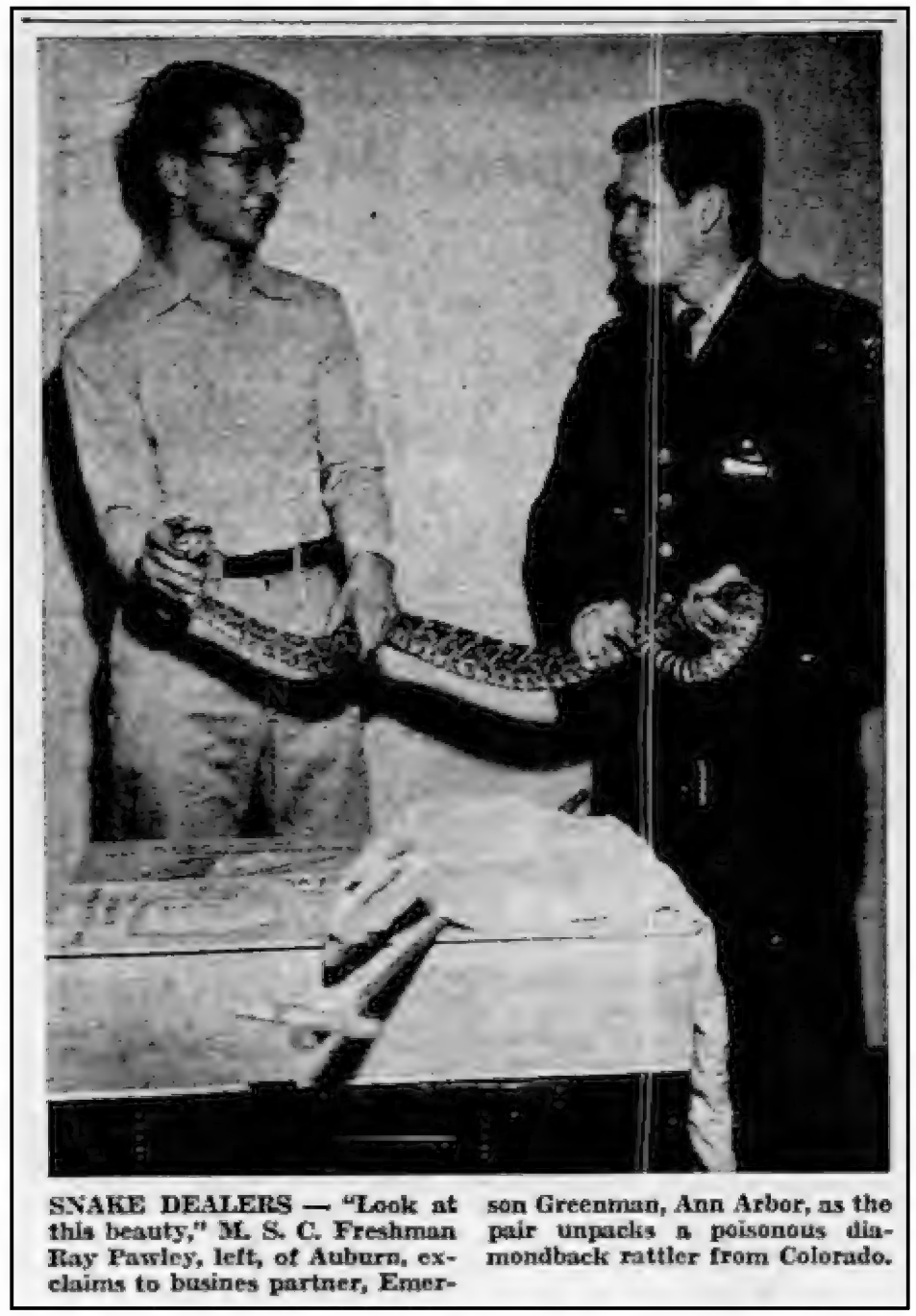
AP Wirephoto

CHICAGO, Sept. 20.—**Mrs. Grace Wiley,** reptile curator at Chicago Zoological Park, was dismissed from her post today because the zoo's snakes prefer wide open spaces to cages. Robert Bean, acting director of the park and admittedly "deathly afraid of snakes," said 19 of the reptiles escaped. Mrs. Wiley said only three were missing and that two had been recaptured, the third probably going down a drain.

Grace Olive Wiley's ideas were certainly controversial, but there can be no doubt that she loved her animals.

free handler of venomous snakes who worked at the Brookfield Zoo until she was fired in 1935. Other Brookfield Zoo herpetologists included Robert Snedigar and Ray Pawley. Michael spent a little more time on Lincoln Park Zoo's Marlin Perkins, telling of Perkins's forays into early television that eventually led to the incredibly popular series, *Wild Kingdom*.

Michael then expanded his talk to the nation and singled out Raymond Ditmars of the Bronx Zoo for extra attention. He stressed that Ditmars was a consummate showman, even managing to get his own wedding in the newspapers as the "First Snake Wedding." A photo showed Ditmars with the new Mrs. Ditmars, who looked somewhat nonplussed. Michael related the story of Ditmars getting a shipment of snakes from Africa in May of 1925. The shipment included 18 green mambas among other animals, and Ditmars, being the wordsmith and publicist that he was, managed to get extensive newspaper coverage for "the biggest bunch of deviltry that I ever tackled." Included in that shipment were some ball pythons, and we saw a photo of Ditmars playing catch with an unfortunate ball python, an action that would probably not be well received today.

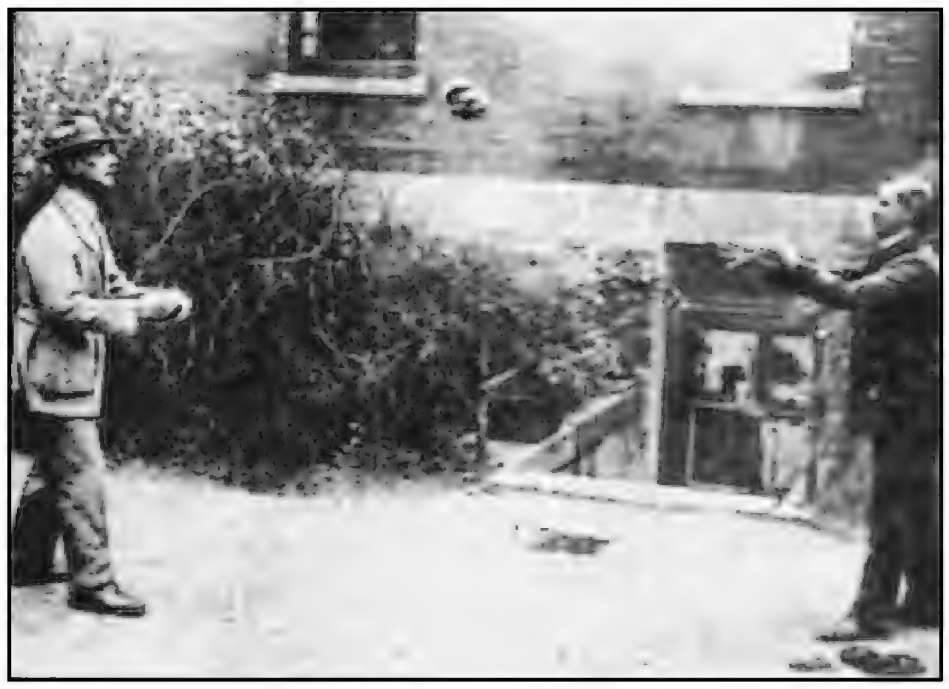


SNAKE DEALERS — "Look at this beauty," M. S. C. Freshman Ray Pawley, left, of Auburn, exclaims to busines partner, Emerson Greenman, Ann Arbor, as the pair unpacks a poisonous diamondback rattler from Colorado.

Former Brookfield Zoo curator Ray Pawley, very early in his career. Ray is still messing with rattlesnakes.

Marlin Perkins, left, handles a nonpoisonous snake during a rehearsal for a television broadcast. Perkins left hand is bandaged from a rattlesnake bite during a similar rehearsal April 1, 1951 in this April 23, 1951 file photo. ***(AP Laserphoto)***

Host of maybe the most famous nature series of all time, *Wild Kingdom*, Marlin Perkins was a superb ambassador for animals.



Ever the consummate showman and publicist, Raymond Ditmars goes too far in showing off his newly arrived ball pythons at the Bronx Zoo.

Joe Laszlo pioneered several areas of herpetoculture, including proper lighting and how to sex snakes by probing.

Michael showed us photos of Teddy Roosevelt and Jimmy Carter, and Ross Allen. He talked of Joe Laszlo, who published a paper on probing snakes in 1975 and pioneered proper lighting. We saw a picture of the first albino corn snake that was bred by Dr. Bernard Bechtel in the late 1950s and was probably the most important event in herpetoculture. Breeding tricolors in the '70s and '80s was probably the first that someone could make a living from herpetoculture. He talked of how popular culture affected the business, with *Teenage Mutant Turtles* exploding turtle sales and *Jurassic Park* spurring imports of green iguanas in the 1990s. In 1990 the Reptile Breeders Expo in Orlando set the stage for breeders to control prices and sales.

Michael moved through his talk with no notes. His slides featured few words. He spoke of the history not only of herpetoculture but also the names that laid the early groundwork for research and he spoke as if he knew each of the subjects intimately. He brought out the good and some of the bad of the industry. And he wrote a book. He was nice enough to donate a copy to our library. If you don't attend the meetings, you can buy it from Eagle Mountain Publishing or Ecouniverse Herpetological Publishing. I haven't read it . . . yet. I'm getting my copy and Michael says he's writing a second volume. I bet I'll buy that too.

Minutes of the CHS Board Meeting, July 19, 2019

Mike Dloogatch called the meeting to order at 7:48 P.M. A quorum was lacking, with John Archer, Mike Dloogatch, Tom Mikosz, Gail Oomens and Mike Scott the only board members in attendance.

Officers' Reports

Treasurer: John Archer presented the financial report for the month of June.

Membership secretary: Mike Dloogatch reported a net gain of five members in the past month. Total membership is up 13 over this time last year.

Sergeant-at-arms: Mike Scott reported attendance of 32 at the May 29 meeting and 37 at the June 26 meeting.

Committee Reports

Shows: Gail Oomens quickly read through of the list of upcoming shows.

ReptileFest: Frank Sladek is still getting positive feedback. He shared his thoughts on adding 4–5 tables of insects in a corner under the title "What's on the menu?" He has been checking the supplies to see what we still have and what is needed for next year.

Junior Herpers: Frank Sladek reported that the July 7 meeting was a Show & Tell, with 42 in attendance. The kids were on point with their information. There was discussion of including a Junior Herper page in the *Bulletin*.

Nominating committee: Jenny Hanson has confirmed which board members would like to keep their positions. The committee is working on filling the empty roles,

New Business

The Humboldt Park alligator has been captured.

Photo shoot: Several CHS members showed up with animals in response to a request for a photo shoot, and were unhappy with what transpired. Discussion ensued regarding vetting such requests in the future.

The meeting adjourned at 9:55 P.M.

Respectfully submitted by recording secretary Gail Oomens

Herpetology 2019

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editor assumes full responsibility for any errors or misleading statements.

VISUAL OBSTRUCTION AND ALLIGATOR STRESS

J. W. Finger, Jr., et al. [2018, Journal of Herpetology 52(4): 398-401] note that anecdotal observations suggest that visual obstruction after capture will calm crocodilians, leading many to hypothesize that eye covering reduces physiological stress. However, this has yet to be tested empirically. To investigate this, the authors randomly divided 20 juvenile American alligators (*Alligator mississippiensis*) into two treatments (visual obstruction [VO] and no obstruction [NO]) and took blood samples immediately after capture (baseline) and 30 min after treatment to determine the effects of visual obstruction on alligator corticosterone (CORT) levels. They found that baseline and post treatment CORT levels were similar between both NO-treated and VO-treated alligators; however, CORT levels were significantly elevated 30 min after capture relative to baseline in both NO and VO alligators. These results indicate that visual obstruction does not prevent or reduce handling stress after capture in crocodilians and that any observed behavioral alterations are independent of changes in CORT levels.

CALICHE CONSUMPTION BY SONORAN DESERT TORTOISES

B. K. Sullivan and T. M. Cahill [2019, Chelonian Conservation and Biology 18(1):98-101] note that Mohave desert tortoises (*Gopherus agassizii*) actively consume calcium-rich soil, bones, and stones, but this "mining" behavior has not been well described for Sonoran desert tortoises (*Gopherus morafkai*). Over 8 yrs of study, they observed female *G. morafkai* consuming small white fragments of calcium-rich and phosphorus-poor caliche, but only during late May and June in an upland Sonoran Desert site in central Arizona. The temporal restriction of caliche consumption coincides with clutch development and egg deposition.

EVIDENCE FOR LEARNING IN LIZARDS

E. Slater et al. [2019, Copeia 107(1):78-84] note that cognition and learning have been widely studied in vertebrates, but not across much phylogenetic breadth. Non-avian reptiles, for example, have been poorly studied. Anecdotal observations and a few previous studies suggest that lizards may have strong cognitive skills owing, in part, to behaviors such as optimal foraging and territoriality. The authors tested four lizard species, including three species of monitor lizard (*Varanus* spp.) and one species of beaded lizard (*Heloderma*), in a longitudinal, repeated-trials experimental design using a puzzle-feeder device to evaluate learning, in the form of latency trends over time. Collectively, all lizards showed a pattern of decreasing latencies over time. The authors interpret this pattern as learning. Notable individual and inter-specific differences were evident, however, suggesting that learning abilities differed among the lizards. In this case, the monitor lizards exhibited steeper declines in latencies and greatly reduced inter-individual variation in comparison to the beaded lizards.

ROAD MORTALITY MITIGATION FOR TURTLES

P. C. Heaven et al. [2019, Copeia 107(1):92-99] note that road mortality has become a primary threat to turtle populations. A variety of strategies have been applied to reduce turtle mortality; however, the effectiveness of these solutions remains largely untested. The few tests that have been conducted have often found the mitigation actions to be ineffective or prohibitively expensive for implementation at a landscape level. Thus, there is a need for inexpensive, effective, and rigorously tested methods for reducing turtle mortality on roads. The authors investigated the potential efficacy of an inexpensive mitigation strategy, consisting of a barrier wall fabricated from High Density Polyethylene (HDPE) half-pipe, partnered with a pre-existing semiaquatic HDPE culvert as an ecopassage. The authors used survey data and a Before-After-Control-Impact experimental design to assess the effectiveness of the mitigation and quantified the use of the ecopassage at the impact site after the barrier wall was installed. They found a significant interaction between the treatment effect and time period, with the impact site (but not control sites) showing significantly lower turtle counts after mitigation. The barrier wall reduced the number of turtles accessing the road by 94%, and there was no evidence of turtles circumnavigating the barrier. Turtles used the pre-existing culvert to pass under the road. The authors conclude that HDPE half-pipe partnered with an existing semiaquatic HDPE culvert can reduce road access by, and road mortality of, turtles. The use of standard road construction materials for barrier walls and underpasses results in a cost-effective design scalable to a landscape level.

USING SMARTPHONES TO COUNT TURTLES

J. Escobar et al. [2018, The Herpetological Journal 28(4): 143-147] note that sampling freshwater turtles using traditional trapping methods can present significant economic investment to researchers. However, collecting baseline data on turtle relative abundance and species presence requires limited investment and can be non-invasive. Recent advances in performance of readily available smartphone cameras enable collection of high quality digital photos of wildlife, accessible to both researchers and citizen scientists. The authors report on the feasibility of using several low cost and lightweight telephoto lens attachments for smartphones to identify turtles from various observational distances. All three magnifiers provided a reliable, effective method for counting turtles with increased standard image resolution, with the number of basking turtles correctly enumerated and identified increasing with decreasing distance to observers (Spearman rank correlation = -0.719). The most consistently usable images for species identification were taken with 10X at distances under ~15 m and in urban pond settings where individuals are potentially less easily startled or where ambient noise is common. Ultimately, these magnifiers can be successfully incorporated into university outdoor biological laboratories, undergraduate research and community citizen science programs.

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Herp tours: **Costa Rica herping adventures**. Join a small group of fellow herpers for 7 herp-filled days. We find all types of herps, mammals, birds and insects, but our target is snakes. We average 52 per trip, and this is our 10th year doing it. If you would like to enjoy finding herps in the wild and sleep in a bed at night with air-conditioning, hot water and only unpack your suitcase once, instead of daily, then this is the place to do it. Go to our web-site <http:// hiss-n-things.com> and read the highlights of our trips. Read the statistics of each trip and visit the link showing photos of the 40 different species we have found along the way. E-mail at jim.kavney@gmail.com or call Jim Kavney, 305-664-2881.

Line ads in this publication are run free for CHS members—$2 per line for nonmembers. Any ad may be refused at the discretion of the Editor. Submit ads to mdloogatch@chicagoherp.org.

NEW CHS MEMBERS THIS MONTH

Eva Chagdes

Jeanne-Jo Gregory

News and Announcements

MIDWEST HERPETOLOGICAL SYMPOSIUM

Join the St. Louis Herpetological Society for the upcoming 35th annual Midwest Herpetological Symposium. The event will take place September 27–29, 2019, at the Airport Holiday Inn in St. Louis Missouri. Visit stlherpsociety.org for more information.

UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, August 28, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. **Sara Ruane**, an assistant professor in the department of biological sciences at Rutgers University Newark, will speak on "Global Snake Diversity: Describing It, Understanding It, and Loving It!" Sara will speak about some of the work she's been doing that exemplifies this amazing diversity, including research on snake diversity in Madagascar, understanding what characteristics makes an arboreal snake arboreal, and how she uses old museum specimens to better understand modern snake systematics. She will also speak a little bit about why being concerned about snake conservation is important, and not just for people who like snakes! Sara did her undergrad work at UMass Amherst, then received an MS at the University of Central Arkansas where she focused on turtle ecology, and a PhD at City University of New York with a focus on snake systematics.

AE (Ann-Elizabeth) Nash, a doctoral student at the University of Northern Colorado, will speak at the September 25 meeting on her research in Palo Verde National Park, Costa Rica, studying social behavior in the spiny-tailed iguana, *Ctenosaura similis*.

The regular monthly meetings of the Chicago Herpetological Society take place at Chicago's newest museum—the **Peggy Notebaert Nature Museum**. This beautiful building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

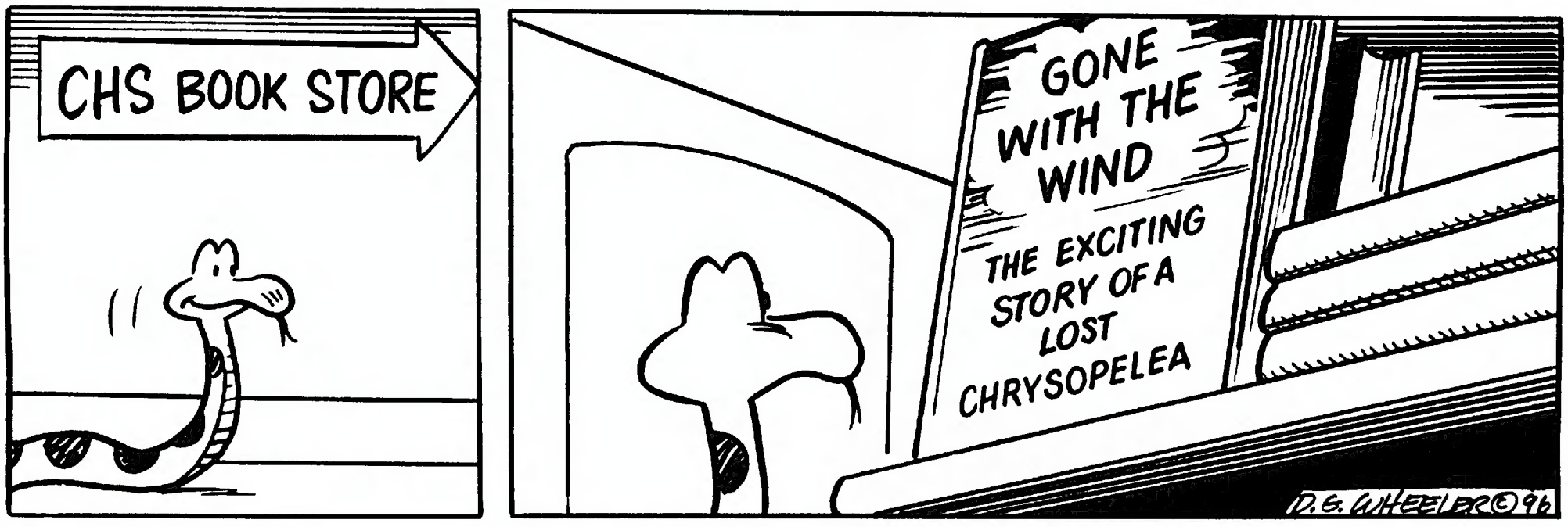
Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? The next board meeting, will take place at 7:30 P.M., September 13, 2019, at Papa Passero's Pizzeria, 6326 S. Cass Ave., Westmont. If you think you might like to attend, please email rcrowley@chicagoherp.org.

The Chicago Turtle Club

The monthly meetings of the Chicago Turtle Club are informal; questions, children and animals are welcome. Meetings normally take place at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Parking is free. For more info visit the group's Facebook page.

THE ADVENTURES OF SPOT



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